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C. E. VAN NORMAN.

COOLING DEVICE FOR EXPLOSIVE ENGINE CYLINDERS.

APPLICATION FILED AUG. 13, 1903.

NO MODEL.

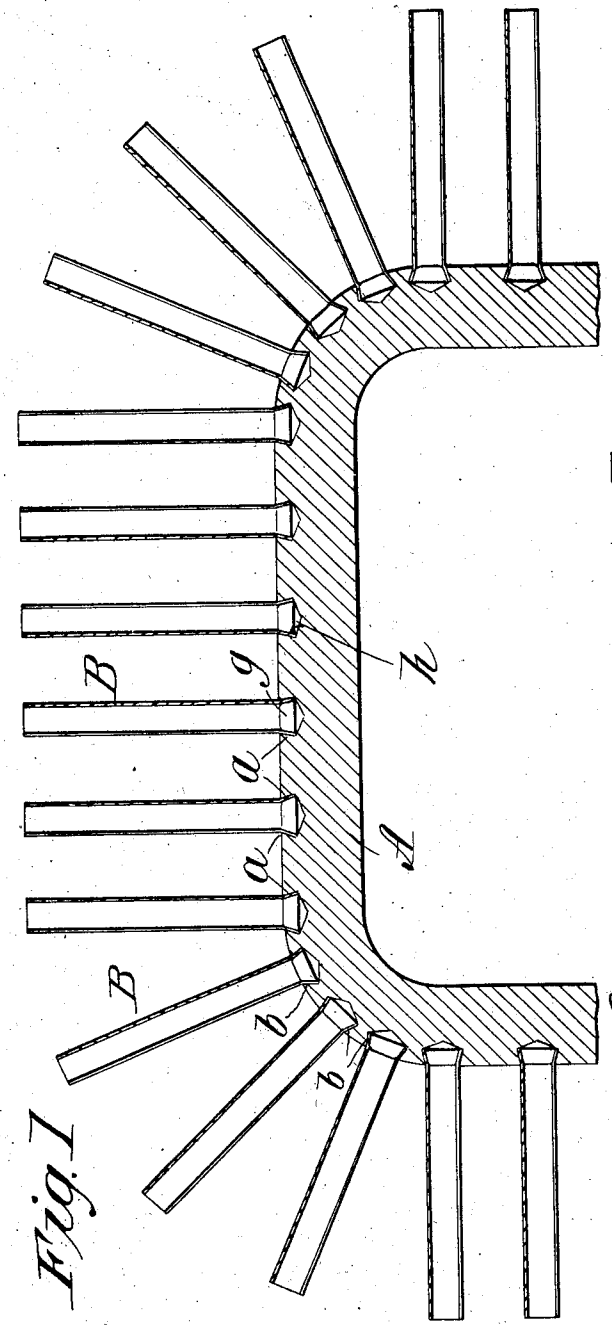


Fig. 1

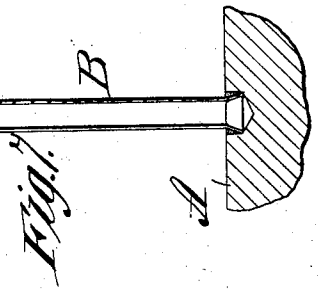


Fig. 1.

Fig. 5.



Fig. 6.



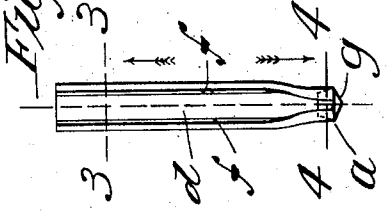
Fig. 3



Fig. 4.



Fig. 2



Witnesses:
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UNITED STATES PATENT OFFICE.

CHARLES E. VAN NORMAN, OF SPRINGFIELD, MASSACHUSETTS.

COOLING DEVICE FOR EXPLOSIVE-ENGINE CYLINDERS.

SPECIFICATION forming part of Letters Patent No. 761,927, dated June 7, 1904.

Application filed August 13, 1903. Serial No. 169,345. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. VAN NORMAN, a citizen of the United States of America, and a resident of Springfield, in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Cooling Devices for Engine-Cylinders, of which the following is a full, clear, and exact description.

This invention relates to provisions applicable in conjunction with a cylinder of an explosive-engine for maintaining the temperature of the cylinder at a desirably low degree without the necessity of water-cooling provisions.

The invention contemplates the combination, with the cylinder, of a multiplicity of plates anchored and joined in sockets therefor within the external side of the cylinder and in direct contact with the metal forming the cylinder, said plates having bent formations, so as to present within a minimum space for their occupancy an unusual extent of surface for radiation and for the impingement of air thereagainst for a rapid cooling thereof.

The improved cylinder-cooling appliances are illustrated in the accompanying drawings, in which—

Figure 1 shows on a comparatively large scale a portion of the cylinder of a gasolene-engine with the heat-radiating and air-cooling projections secured thereto. Fig. 2 is a side view of one of the appliances, Figs. 3 and 4 being cross-sectional views on lines 3 3 and 4 4, respectively. Fig. 5 shows an approved form of device advantageous in securing the anchorage of the cooling projections in the wall of the cylinder. Fig. 6 shows a modified cross-sectional form of the plate, and Fig. 7 shows the same as received in the socketed cylinder-wall by brazing.

In the drawings, A represents a portion of the wall of a cylinder, and B B represent the projections for leading the heat developed in the cylinder outwardly to be subjected to the cooling action of the air relatively thereto. These projections are constructed of metal plates or sheets having shanks *a* of tubular or partial tubular form, as indicated at *a*, for insertion and connection in contact with the peripheral walls of circular sockets *b* therefor in the cylinder-wall, the connection and anchorage being susceptible of accomplishment in various ways, one of the approved expedients to this end being hereinafter pointed out. The sheets or plates outwardly beyond their inner ends, which are connected in direct contact in the sockets of the cylinder, are bent in a manner to give a large extent of air contact at opposite sides, and yet so that they will not occupy large space transversely relatively to the longitudinal lines thereof. These projections which are shown in accordance with the foregoing are in the form of troughs or partial tubes having a longitudinal opening *d* between their edges *f f*, such openings freely admitting the air therewithin and to what may be termed the "inner" surface of the sheet metal, so that there is practically as great freedom of air circulation relatively to the inner surface as to the outer surface. Other cross-sectional forms of the plates or wings from that shown in Fig. 3 may be imparted thereto—as, for instance, a form cross-sectionally comprising sections which are angular to each other instead of portions which merge one into another on a continuous curve, as seen in Fig. 6.

In acquiring the anchorage of the partial tubular plates or the plates having the shanks of approximately tubular form in the circular sockets in the wall of the cylinder metallic blocks *g* of frusto-conical form are let concentrically into the sockets to rest on the bases thereof, leaving annular spaces between their peripheries and the socket-walls, and by forcing the lower ends of the tubular shank projections *b* down over and about the said tapered blocks such shanks are expanded and outwardly crowded to a firm bind between the blocks and the walls of the sockets. The socket-walls may be undercut, as represented in the drawings, such formation increasing the efficiency of the connection, although usually the forcing of the tubular shank of the thin metal projection over the expanding block *g* will suffice even when the socket is of uniform diameter at all portions of its height; but it is

advantageous to have the shank of the projection externally in surface-contact with the wall of the socket throughout the whole area thereof, which is sunk within the latter in order to acquire heat-conductive perfection, to which the block *g* also contributes. Conducive to convenience in assemblage of the parts the bases of the sockets are made of flattened conical form, as indicated at *h*, and the bases of the upwardly-tapering frusto-conical blocks are also correspondingly of flattened conical form corresponding to the socket-bases, so that the blocks when dropped into the socket will be self-centering.

The blocks are made separately from the socketed cylinder-wall for purposes of practicability or convenience, although their objects would be served in the manner described therefor were they made as tapered bosses integral with the central portions of the cylinder-wall within the sockets.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. An engine-cylinder having a plurality of sockets in its outer wall, and a plurality of radially-arranged projections, each having an end seated in one of said sockets, each projection consisting of a tubular body open throughout its entire length, and a side opening in said body communicating with the interior thereof and extending from the engine-cylinder to the outer end of the projection.

2. An engine-cylinder having a plurality of sockets in its outer wall, and a plurality of radially-arranged projections each having an end seated in one of said sockets, each projection being formed of a rectangular plate bent to constitute a tubular body, the edges of said plate being spaced apart to provide a side opening extending from end to end of the body.

3. An engine-cylinder, having a plurality of sockets in its outer wall, and a plurality of radially-arranged projections each having an end seated in one of said sockets, each projection being formed of a rectangular plate bent to constitute a tubular body, the longitudinal edges being spaced apart from each other to provide a side opening extending from end to end of the body, the lower end of the body being contracted to provide a substantially cylindrical shank to engage substantially all portions of the wall of the socket in which it is seated.

Signed by me at Springfield, Massachusetts, in presence of two subscribing witnesses.

CHARLES E. VAN NORMAN.

Witnesses:

WM. S. BELLOWS,

A. V. LEAHY.